

A satisfactory general explanation of all the phenomena is found in the view that with a smooth sphere, cohesion is operative in guiding the advancing edge of the liquid sheath which rises over and closely envelops the sphere. If the surface is not rigid (*e.g.*, is dusty), or is rough, then the momentum of the sheath carries it, once for all, away from the surface of the sphere, and the subsequent motion is quite different. The persistence of the remarkable radial ribs or flutings observable in the film that ensheathes a smooth entering sphere is completely explained by the assumption of a viscous drag spreading from the surface of the sphere outwards, and these flutings are always absent from any part of the sheath that has left the sphere. Their presence is an indication that there is no finite slip at the solid surface.

Experiments made with water mixed with glycerine show that, up to a certain point, the character of the disturbance is but slightly affected by large changes in viscosity. With pure glycerine, however, a thin film of water absorbed from the atmosphere equivalent to a layer $\frac{1}{20}$ mm. thick, was found completely to change the course of a splash, a striking proof of the importance of the initial motion in determining that which is to follow.

Experiments conducted *in vacuo* prove that the presence of the air has no noticeable influence on the early course of a splash, but that its pressure subsequently prevents cavitation of the liquid under what would otherwise be negative pressures.

The paper concludes with a reference to the remarkable similarity between the splash at the surface of a liquid and that caused at the surface of a hard-steel armour-plate by the impact of a projectile, and with the suggestion that the explanation may be found in the argument of Poynting,* which demands an increase of molecular mobility with increase of pressure.

“An Observation on Inheritance in Parthenogenesis.” By ERNEST WARREN, D.Sc., University College, London. Communicated by Professor W. F. R. WELDON, F.R.S. Received March 22, —Read May 4, 1899.

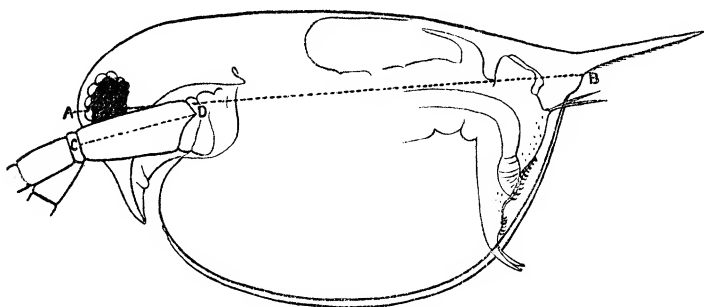
On certain theoretical grounds it has been supposed by Weismann that offspring produced by parthenogenesis exhibit little or no variability. To determine how far this conclusion was warranted by fact, some measurements were made on *Daphnia magna* (Straus).†

* Poynting, “Change of State, Solid-Liquid,” ‘Phil. Mag.,’ July, 1881; see also two very important papers by Tresca on the “Flow of Solids,” ‘Proceedings of Institution of Mechanical Engineers,’ June, 1867, and June, 1878.

† The measurements were made under the microscope with Zeiss’s screw-micrometer.

The dimensions taken were :—

(1) The *total length of the body* measured along a line passing ventrally from the base of the spine and cutting the convex surface of the head opposite the middle of the compound eye (AB, see figure).



(2) The *length of the protopodite* of the 2nd antenna of the right side. The measurement was made on the posterior surface of the protopodite along a line parallel to the dorsal edge. At the articulation with the head the exo-skeleton of the protopodite possesses a well defined point, which forms a good inner limit to the measurement (CD).

Since, under favourable conditions, these animals continue to grow throughout life, the second dimension was expressed in terms of the first, thus $\frac{\text{Length of R. protopodite}}{\text{Total length of body}} \times 1000$.

The mean of the relative length of the protopodite sinks as the animal grows, but between a body length of 2.4 mm. and 3.6 mm. (the total range of size) the change would not be large. I find that at the time of measurement the offspring were constantly somewhat smaller (0.4 to 0.5 mm.) than the parents, but as this applies to *all* the broods which were measured, the rise in the mean of the offspring would not affect the correlation surface.

From twenty-three *Daphnia* (themselves originating by parthenogenesis) broods were produced consisting of three to six individuals. The parents were measured, and the offspring were allowed to grow up. On measuring the offspring it was at once obvious that the children of the same brood exhibited very considerable variability.

In the following table (p. 156) the results of the measurements are displayed in a correlation surface.

The table illustrates the variability of children of the same parthenogenetic family, and we can further see, for example, that offspring with a parentage of 169.5 thousandths exhibited a range of variation 159.5—181.5 thousandths.

The following constants were calculated :—

Parentage. Length of R. protopodite Total length of body × 1000.	Correlation surface.														Weighted mothers.	Actual No. of mothers
	1	2	3	4	5	6	7	8	9	10	11	12	13	14		
159-160	1														5	1
161-162	2														0	0
163-164	3														12	2
165-166	4														23	6
167-168	5														10	2
169-170	6														20	5
171-172	7														4	1
173-174	8														12	3
175-176	9														6	2
177-178	10														4	1
Offspring.	1	186-185	14												96	23
	0	184-183	13													
	2	182-181	12													
	6	180-179	11													
	10	178-177	10													
	13	176-175	9													
	5	174-173	8													
	10	172-171	7													
	8	170-169	6													
	11	168-167	5													
	15	166-165	4													
	8	164-163	3													
	5	162-161	2													
	2	160-159	1													

1. The standard deviation (S. D.) of the mothers weighted according to the number of offspring produced = 2.2208
2. The standard deviation of the offspring = 2.9503
3. The standard deviation of array of offspring = 2.6104
4. The coefficient of correlation = 0.466 ± 0.0539
5. The coefficient of regression of offspring on mothers..... = 0.619 ± 0.0809

According to Mr. Galton's theory of ancestral heredity, a child, on the average, inherits 1/4th of any inherited character from either of its parents, 1/16th from any one of its grandparents, 1/64th from any one of its eight great grandparents, and so on.

From a mathematical standpoint Professor Pearson* has examined Mr. Galton's theory, and he finds that if it be expressed in the form

$$\left(\frac{1}{4}\right)^n \frac{\text{S.D. of offspring}}{\text{S.D. of individual parent of the } n\text{th generation}}$$

the coefficients of correlation and regression between offspring and any generation of ancestors flow directly from it. Professor Pearson shows that the total regression of the progeny on the *mid-parent* of any generation is constant and is equal to 0.6, while the correlation and regression of an *individual parent* of the *n*th generation (supposing equal variability for all generations) = $0.6\left(\frac{1}{2}\right)^n$ and the correlation of the *mid-parent* of the *n*th generation = $0.6\left(\frac{1}{\sqrt{2}}\right)^n$.

Hence the coefficients of correlation and regression of an individual parent of the 1st generation (*i.e.*, *father* or *mother*) = $0.6\left(\frac{1}{2}\right)^1 = 0.3$, and the coefficient of correlation of the *mid-parent* = $0.6\left(\frac{1}{\sqrt{2}}\right)^1 = 0.424$, and the coefficient of regression, as we have just seen above, = 0.6.

Now, on comparing observation with theory, we see that the parthenogenetic mother appears to act like a *mid-parent*; the coefficients of correlation and regression being respectively 0.466 and 0.619.

Further, we know $\frac{\text{S.D. of mid-parents}}{\text{S.D. of progeny}} = \frac{1}{\sqrt{2}} = 0.71$, and in the present case $\frac{\text{S.D. of parthenogenetic mothers}}{\text{S.D. of progeny}} = \frac{2.22}{2.95} = 0.75$.

Among my notes there are recorded the measurements of twenty-six grandchildren, the offspring of seven grandparents. With these the coefficients of correlation and regression were calculated. On account of the altogether insufficient number of individuals, the results were bound to be very uncertain, but they appear to favour the view that inheritance in parthenogenetic generations resembles that from

* 'Roy. Soc. Proc.,' vol. 62, pp. 386—412.

mid-grandparent to grandchildren. The coefficient of correlation was 0.272 ± 0.12 , and the coefficient of regression = 0.5 ± 0.2 , while, according to theory, they should be 0.3 and 0.6 respectively.

The evidence of these measurements cannot be said to be conclusive, and I am about to test the theory on some other parthenogenetic animal. If, however, this kind of inheritance be found to hold at all generally in parthenogenesis, it would be a fact of very considerable significance, and might conceivably give some insight into the physiological causes of heredity and variation.

“*Onygena equina* (Willd.): a Horn-destroying Fungus.” By H. MARSHALL WARD, D.Sc., F.R.S., Professor of Botany in the University of Cambridge. Received April 6,—Read May 4, 1899.

(Abstract.)

The genus *Onygena* comprises half a dozen species of fungi, all very imperfectly known, remarkable for their growth on feathers, hair, horn, hoofs, &c., on which their sporocarps appear as drum-stick shaped bodies 5—10 mm. high. A cow's horn, thoroughly infested with the mycelium of the present species, yielded material for the investigation, and the author has not only verified what little was known, but has been able to cultivate the fungus and trace its life-history, neither of which had been done before, and to supply some details of its action on the horn.

The principal new points concern the development of the sporophores, which arise as domed or club-shaped masses of hyphæ and stand up into the air covered with a glistening white powder. Closer investigation shows this to consist of chlamydospores, formed at the free ends of the up-growing hyphæ. Their details of structure and development are fully described, and their spore nature proved by culture in hanging drops. The germination, growth into mycelia, and peculiar biology of these hitherto unknown spores were followed in detail, and in some cases new crops of chlamydospores obtained direct in the cultures.

When the crop of chlamydospores on the outside of the young sporophore is exhausted, the hyphæ which bore the spores fuse to form the peridium clothing the head of the sporocarp, and peculiar changes begin in the internal hyphæ below.

Minute tufts or knots of claw-like filaments spring from the hyphæ forming the main mass of the fungus, push their way in between the latter, and so find room in the mesh-like cavities. Here the closely segmented claws form asci—they are the ascogenous hyphæ—and the